

SIMILAR SHAPES

Models of original objects

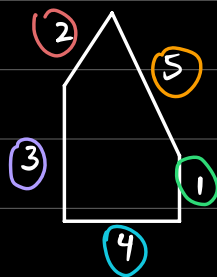
SIMILARITY

MENSURATION
(LAST PART)

CONDITIONS FOR BEING SIMILAR

- 1- AAA If all angles of two shapes are equal these shapes are called similar.
2. Ratio of corresponding sides is equal

Q: Check whether these two shapes are similar:



Shape 1



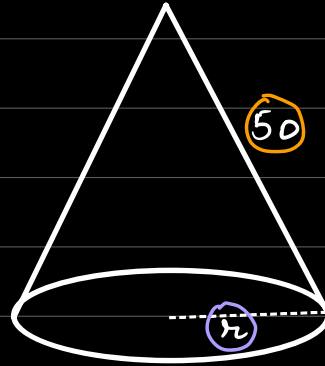
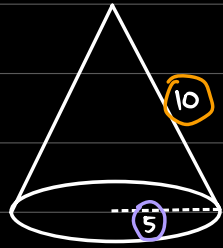
Shape 2

$$\frac{\text{Shape 2}}{\text{Shape 1}} = \frac{20}{5} \quad \frac{5}{5} \quad \frac{25}{5} \quad \frac{10}{5} \quad \frac{14}{3}$$

5 5 5 5 Not

Shape 1 and Shape 2 are not similar.

Q.



Cone 1 and cone 2 are similar. Find r .

$$\frac{SD}{10} = \frac{r}{5}$$

$$5 \times 5 = r$$

$$r = 25$$

IF TWO SHAPES ARE SIMILAR
THEY FOLLOW THESE FORMULAS

AREA
cm², m², km²

$$\frac{A_1}{A_2} = \left(\frac{L_1}{L_2} \right)^2$$

$\frac{L_1}{L_2}$ is ratio of
corresponding sides.

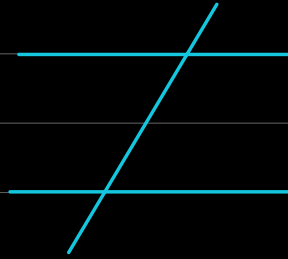
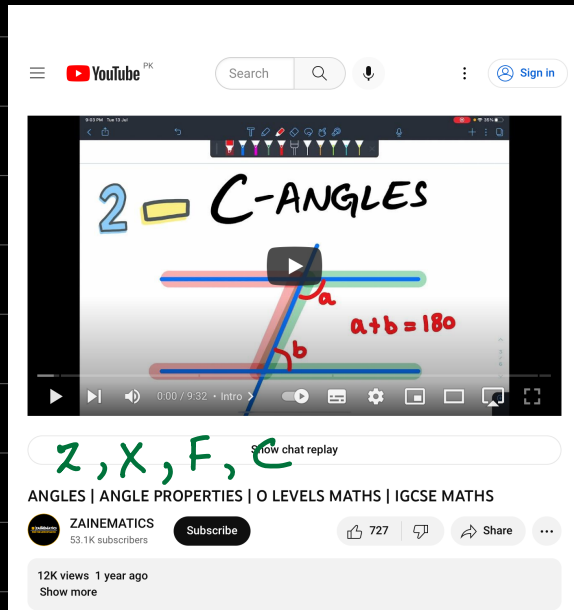
VOLUME
mm³, cm³, m³, litres

$$\frac{V_1}{V_2} = \left(\frac{L_1}{L_2} \right)^3$$

MASS
grams, kg

$$\frac{M_1}{M_2} = \left(\frac{L_1}{L_2} \right)^3$$

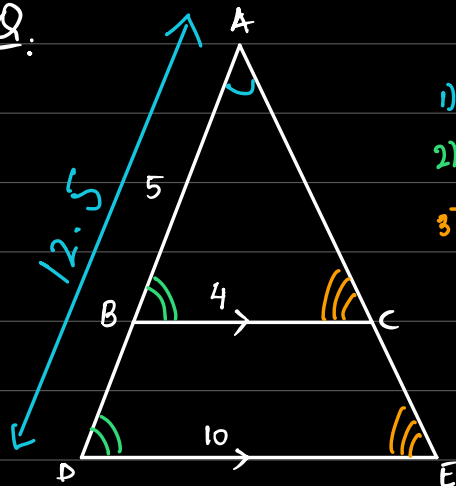
Till here, we have seen this in MENSURATION



X angles = Vertically opposite.
Z angles = Alternate angles.
F angles = Corresponding angles.
C angles = Supplementary angles.

AAA

Q:



(i) Prove that ΔABC is similar to ΔADE

- 1) angle BAC is common in both triangles.
- 2) angle ABC = angle ADE (corresponding angles)
- 3) angle ACB = angle AED (corresponding angles)

Hence by AAA property,

ΔABC is similar to ΔADE .

$$\frac{AB}{AD} = \frac{BC}{DE} = \frac{AC}{AE}$$

(ii) Find BD

$$\frac{AB}{AD} = \frac{BC}{DE}$$

$$\frac{5}{AD} = \frac{4}{10}$$

$$4 \times AD = 50$$

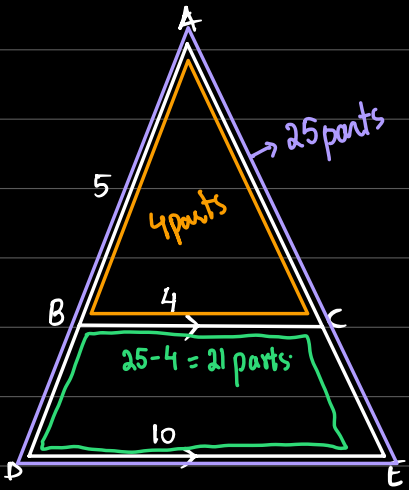
$$AD = 12.5$$

$$BD = 12.5 - 5 = 7.5$$

$$\frac{AB}{AD} = \frac{BC}{DE} = \frac{AC}{AE}$$

(iii) Find ratio $\frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta ADE}$ } similar $= \left(\frac{L_1}{L_2}\right)^2 = \left(\frac{4}{10}\right)^2 = \left(\frac{2}{5}\right)^2 = \frac{4}{25}$

(iii) Find Ratio $\frac{\text{Area of } \Delta ABC}{\text{Area of trapezium BCED}} = \frac{4}{21}$



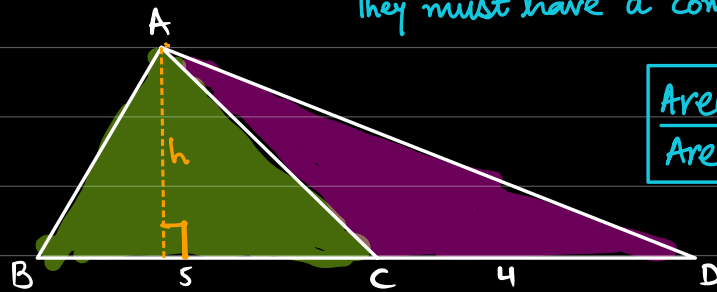
$$\frac{\text{Area of } \triangle ADE}{\text{Area of trapezium BCED}} = \frac{25}{21}$$

$$\frac{\triangle ABC}{\triangle ADE} = \frac{4 \text{ parts}}{25 \text{ parts}}$$

Special Case For RATIO OF AREA OF TRIANGLES

Ratio of area of triangles that are NOT SIMILAR

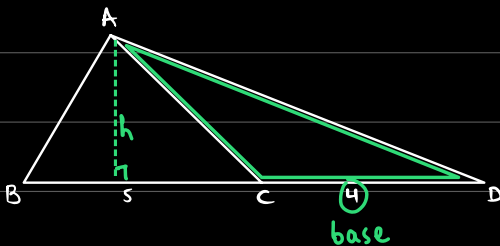
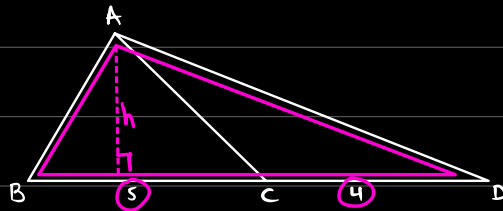
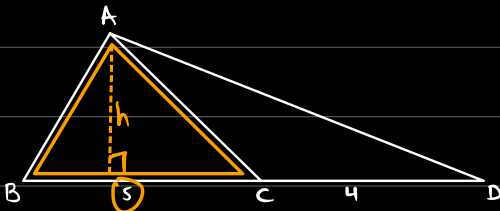
They must have a common (same) height



$$\frac{\text{Area}_1}{\text{Area}_2} = \frac{\text{base}_1}{\text{base}_2}$$

Find Ratio of $\frac{\text{area of } \triangle ABC}{\text{area of } \triangle ABD} = \frac{\text{base}_1}{\text{base}_2} = \frac{5}{9}$

Find ratio of $\frac{\text{area of } \triangle ABC}{\text{area of } \triangle ACD} = \frac{\text{base}_1}{\text{base}_2} = \frac{5}{4}$



Ratio of area of triangles

SIMILAR

$$\frac{A_1}{A_2} = \left(\frac{L_1}{L_2}\right)^2$$

NOT SIMILAR

Now they must have a ^(same) common height.

$$\frac{A_1}{A_2} = \frac{\text{base}_1}{\text{base}_2}$$

